

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings of claims in this application.

LISTING OF CLAIMS:

1. (Currently Amended) An image processing device comprising:

a first color detection means for detecting colors of a first image data by each processing unit;

a second color detection means for detecting colors of a second image data that serves as the first image data's background by each processing unit; and

a color adjusting means for specifying a uniform adjusting color, based on the colors of the first image data and the colors of the second image data, that makes the first image data recognizable against all colors of the second image data that serves as the first image data's background, concerning the first image data that have approximately equal colors.

2. (Original) An image processing device as claimed in claim 1, further comprising:

an image synthesizing means for synthesizing the first image data converted into said adjusting color with said second image data.

3. (Original) An image processing device as claimed in claim 1, wherein said processing unit is a pixel.

4. (Currently Amended) An image processing device as claimed in claim 1, further comprising:

a first memory means for storing the colors of the first image data by each of the approximately equal colors; and

a second memory means for storing the colors of the second image data that serves as the first image data's background, said colors of which are correlated to each of the corresponding colors of the first image data that are stored in said first memory means; wherein

said color adjusting means includes an average color value calculating means for calculating an average value of all the colors of the second image data correlated to each of the colors of the first image data, and an adjusting color calculating means for calculating said adjusting color for each of the colors of the first image data based on each of the colors of the first image data and the average color value of the second image data calculated in correspondence with each of the colors of the first image data.

5. (Original) An image processing device as claimed in claim 4, further comprising:

a judging means for judging that colors of the first image data are approximately equal when a sum of squares of the differences of their coordinate values in a specified color system is less than a specified value.

6. (Original) An image processing device as claimed in claim 4, wherein said average color value calculating means calculates the average value of the coordinate values of the colors of the second image data in a specified color system.

7. (Original) An image processing device as claimed in claim 6, wherein when a color of the first image data stored in said first memory means, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are expressed in the L*a*b* color system as (L_n, a_n, b_n) , (L_{An}, a_{An}, b_{An}) , and (L_{nc}, a_{nc}, b_{nc}) ,

said adjusting color calculating means calculates the (L_{nc}, a_{nc}, b_{nc}) that maximizes the value J in the following formulas:

$$J = (L_{nc} - L_{An})^2 + (a_{nc} - a_{An})^2 + (b_{nc} - b_{An})^2$$

$$H = b_n/a_n.$$

8. (Original) An image processing device as claimed in claim 6, wherein when a color of the first image data stored in said first memory means, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are expressed in the L*a*b* color system as (L_n, a_n, b_n) , (L_{An}, a_{An}, b_{An}) , and (L_{nc}, a_{nc}, b_{nc}) ,

said adjusting color calculating means sets

$$a_{nc} = |a_n|, \text{ when } a_{An} < 0; a_{nc} = -|a_n|, \text{ when } a_{An} \geq 0,$$

$b_{nc} = |b_n|$, when $b_{An} < 0$; $b_{nc} = -|b_n|$, when $b_{An} \geq 0$, and maximizes L_{nc} .

9. (Original) An image processing device as claimed in claim 1, wherein said first image data is an image data that represents character images.

10. (Previously Presented) An image processing device as claimed in claim 4, further comprising:

a third memory means for storing said second image data.

11. (Original) An image processing device as claimed in claim 2, further comprising:

a file preparing unit for preparing an electronic file based on the image data synthesized by said image synthesizing means.

12. (Original) An image processing device as claimed in claim 1, further comprising:

a scanner unit for obtaining said first image data and/or said second image data by means of reading a document.

13. (Original) An image processing device as claimed in claim 2, further comprising:

a printer unit for printing images on recording media based on the image data synthesized by said image synthesizing means.

14. (Currently Amended) A storage device containing a program product for image processing that causes a computer to execute a process comprising the steps of:

detecting colors of a first image data by each processing unit;

detecting colors of a second image data that serves as the first image data's background by each processing unit; and

specifying a uniform adjusting color, based on the colors of the first image data and the colors of the second image data, that makes the first image data recognizable against all colors of the second image data that serves as the first image data's background, concerning the first image data that have approximately equal colors.

15. (Previously Presented) A storage device containing a program product as claimed in claim 14, wherein said process further comprising the step of:

synthesizing the first image data converted into said adjusting color with said second image data.

16. (Previously Presented) A storage device containing a program product as claimed in claim 14, wherein

said processing unit is a pixel.

17. (Currently Amended) A storage device containing a program product as claimed in claim 14, wherein said process further comprises ~~comprising~~ the steps of:

storing the colors of the first image data by each of the approximately equal colors into a specified memory means; and

storing the colors of the second image data that serves as the first image data's background, said colors of which are correlated to each of the corresponding colors of the first image data that are stored in said specified memory means;

wherein

said step of specifying a uniform adjusting color includes the steps of:
calculating an average value of all the colors of the second image data correlated to each of the colors of the first image data, and calculating said adjusting color for each of the colors of the first image data based on each of the colors of the first image data and the average color value of the second image data calculated in correspondence with each of the colors of the first image data.

18. (Previously Presented) A storage device containing a program product as claimed in claim 17, wherein said process further comprises ~~comprising~~ the step of:

judging that colors of the first image data are approximately equal when a sum of squares of the differences of their coordinate values in a specified color system is less than a specified value.

19. (Previously Presented) A storage device containing a program product as claimed in claim 17, wherein

said step of calculating average value is for calculating the average value of the coordinate values of the colors of the second image data in a specified color system.

20. (Previously Presented) A storage device containing a program product as claimed in claim 19, wherein

when a color of the first image data stored in said specified memory means, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are expressed in the L*a*b* color system as (Ln, an, bn), (LAn, aAn, bAn), and (Lnc, anc, bnc),

said step of specifying a uniform adjusting color is for calculating the (Lnc, anc, bnc) that maximizes the value J in the following formulas:

$$J = (Lnc - LAn)^2 + (anc - aAn)^2 + (bnc - bAn)^2$$

$$H = bn/an.$$

21. (Previously Presented) A storage device containing a program product as claimed in claim 19, wherein

when a color of the first image data stored in said specified memory means, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are expressed in the L*a*b* color system as (Ln, an, bn), (LAn, aAn, bAn), and (Lnc, anc, bnc),

said step of specifying a uniform adjusting color is for setting

$anc = |an|$, when $aAn < 0$; $anc = -|an|$, when $aAn \geq 0$,

$bnc = |bn|$, when $bAn < 0$; $bnc = -|bn|$, when $bAn \geq 0$, and maximizing

Lnc.

22. (Previously Presented) A storage device containing a program product as claimed in claim 14, wherein

said first image data is an image data that represents character images.

23. (Currently Amended) A storage device containing program product as claimed in claim 15, wherein said process further comprises ~~comprising~~ the step of:

preparing an electronic file based on the image data synthesized at said step of synthesizing.

24. (Currently Amended) An image processing method comprising the steps of:

detecting colors of a first image data by each processing unit;

detecting colors of a second image data that serves as the first image data's background by each processing unit; and

specifying a uniform adjusting color, based on the colors of the first image data and the colors of the second image data, that makes the first image data recognizable against all colors of the second image data that serves as the first image data's background, concerning the first image data that have approximately equal colors.

25. (Original) An image processing method as claimed in claim 24, further comprising the step of:

synthesizing the first image data converted into said adjusting color with said second image data.

26. (Original) An image processing method as claimed in claim 24, wherein

said processing unit is a pixel.

27. (Currently Amended) An image processing device comprising:
a first color detector for detecting colors of a first image data by each unit of first image data;

a second color detector for detecting colors of a second image data that serves as the first image data's background by each unit of second image data; and

a color adjusting circuit for specifying a uniform adjusting color, based on the colors of the first image data and the colors of the second image data, that makes the first image data recognizable against all colors of the second image data that serves as the first image data's background, concerning the first image data that have approximately equal colors.

28. (Previously Presented) An image processing device as claimed in claim 27, further comprising:

an image synthesizing circuit for synthesizing the first image data converted into said adjusting color with said second image data.

29. (Previously Presented) An image processing device as claimed in claim 27, wherein said units are pixels.

30. (Currently Amended) An image processing device as claimed in claim 27, further comprising:

a first memory for storing the colors of the first image data by each of the approximately equal colors; and

a second memory for storing the colors of the second image data that serves as the first image data's background, said colors of which are correlated to each of the corresponding colors of the first image data that are stored in said first memory; wherein

said color adjusting circuit includes an average color value calculating circuit for calculating an average value of all the colors of the second image data correlated to each of the colors of the first image data, and an adjusting color calculating circuit for calculating said adjusting color for each of the colors of the first image data based on each of the colors of the first image data and the average color value of the second image data calculated in correspondence with each of the colors of the first image data.

31. (Previously Presented) An image processing device as claimed in claim 30, further comprising:

a judging circuit for judging that colors of the first image data are approximately equal when a sum of squares of the differences of their coordinate values in a specified color system is less than a specified value.

32. (Previously Presented) An image processing device as claimed in claim 30, wherein

said average color value calculating circuit calculates the average value of the coordinate values of the colors of the second image data in a specified color system.

33. (Previously Presented) An image processing device as claimed in claim 32, wherein when a color of the first image data stored in said first memory, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are expressed in the $L^*a^*b^*$ color system as (L_n, a_n, b_n) , (L_{An}, a_{An}, b_{An}) , and (L_{nc}, a_{nc}, b_{nc}) ,

said adjusting color calculating circuit calculates the (L_{nc}, a_{nc}, b_{nc}) that maximizes the value J in the following formulas:

$$J = (L_{nc} - L_{An})^2 + (a_{nc} - a_{An})^2 + (b_{nc} - b_{An})^2$$

$$H = b_n/a_n.$$

34. (Previously Presented) An image processing device as claimed in claim 32, wherein when a color of the first image data stored in said first memory, an average color value of the second image data calculated in correspondence with the color of the first image data, and an adjusting color of the first image data are

expressed in the $L^*a^*b^*$ color system as (L_n, a_n, b_n) , (L_{An}, a_{An}, b_{An}) , and (L_{nc}, a_{nc}, b_{nc}) ,

said adjusting color calculating circuit sets

$a_{nc} = |a_n|$, when $a_{An} < 0$; $a_{nc} = -|a_n|$, when $a_{An} \geq 0$,

$b_{nc} = |b_n|$, when $b_{An} < 0$; $b_{nc} = -|b_n|$, when $b_{An} \geq 0$, and maximizes L_{nc} .

35. (Previously Presented) An image processing device as claimed in claim 27, wherein said first image data is an image data that represents character images.

36. (Previously Presented) An image processing device as claimed in claim 30, further comprising a third memory for storing said second image data.